REMARKS

Claims 19 and 20 have been canceled. Claims 1-18, 21 and 22 and new Claims 23-25 are active in the case. Claims 10-15, 18 and 22 stand withdrawn from consideration. Reconsideration is respectfully requested.

Applicants' representative wishes to thank Examiners Parvini and Lorengo for the helpful and courteous discussion of May 28, 2008. As a result of the discussion, it is believed that the issues in the case have been clarified and that the prosecution of the application has been materially advanced.

The present invention relates to a precipitated silica.

Specification Amendments

The specification on page 7 has been amended by deleting a repetitious paragraph from the text. Entry of the amendment is respectfully requested.

Claim Amendments

Many of the claims have been amended to make minor grammatical changes to the claims. Claims 19 and 20 have been canceled and new Claims 23 to 25 have substituted for the canceled claims. None of the amendments, nor the new claims, introduce new matter into the case. Entry of the amendments and new claims into the record is respectfully requested.

Claim Rejection, 35 USC 112

The rejection of Claims 19 and 20 is believed to have been obviated by the cancellation of these claims in favor of new Claims 23-25 which do not employ the "use of" language of Claims 19 and 20. Withdrawal of the rejection of these claims is respectfully requested.

Claim Rejection, 35 USC 103

Claims 1-4, 6-9, 16, 17 and 19-21 stand rejected based on 35 USC 103(a) as obvious over Esch et al, U.S. Patent 5,846,506 in view of Boyer et al, U.S. Patent 5,935,543. This ground of rejection is respectfully traversed.

As stated by applicants' representative at the interview, it must be borne in mind that precipitated silicas always have silanol groups on their surfaces. It therefore is readily apparent that the greater the surface area of a silica, the greater the absolute number of the silanol groups. The absolute number of the silanol groups is expressed in terms of the Sears value V_2. The discovery of the present invention is that for the first time, applicants have been successful in increasing the number of silanol groups on a given surface area of a precipitated silica. Stated in other terms, the silica of the present invention, while having a BET surface area which is identical to embodiments of known precipitated silicas, have a higher absolute number of silanol groups. That is, the present precipitated silica has a higher Sears number V_2. Accordingly, in order to eliminate the effect of the surface area of a silica on the silanol number, the ratio of the absolute number of silanol groups to the BET surface area is taken and a normalized, relative group density is of silanol groups is obtained. This normalized number is present in the claims of the invention and is a value of 0.150 to 0.280 $ml/(5m^2)$.

The importance of the silanol groups on the surface of the silica is described in the paragraph that bridges pages 13 and 14 of the text, as explained at the interview. The silanol groups can react with a coupling reagent such as bis(3-triethoxysilylpropyl)tetrasulfane while another portion of the coupling molecule reacts with the rubber matrix material. Thereby achieving bonding of the silica to the rubber matrix. The greater the number of silanol groups, the greater the degree of coupling between the silica and the coupling reagent. This greater degree of coupling increases the bonding of the silica particles to the rubber matrix,

thereby resulting in a greater reinforcement potential. The Sears value V_2 is a factor which permits a description of the number of silanol groups in the silica. On the other hand, the BET surface area of a silica is its specific surface area, which has a major effect on the processing behavior of a compounded material, and on the material's other properties after vulcanization. However, the absolute number of silanol groups is not itself sufficient for adequate characterization of a precipitated silica, because precipitated silicas with a high surface area generally have a higher absolute number of silanol groups than precipitated silicas with a low surface area. The important factor is therefore the quotient that is calculated by dividing the Sears value V_2 by the BET surface area. In this way it is possible to represent the reinforcement potential generated via the silanol groups per unit of specific surface area introduced.

Turning now to the Esch et al patent, while the patent discloses a precipitated silica for dispersal in a rubber matrix, there is no teaching or suggestion of a normalized V_2 factor for the silica that is disclosed. That is, while the patent discloses the determination of a silanol group density of a silica which has a range of 6 to 20 ml, there is no description of a silica having a higher than normal amount of surface silanol groups and the significance of such an amount, and certainly there is no description of a normalized silanol group concentration, which, as discussed above, is a direct indication of an enhanced degree or amount of coupling of silica particles to rubber matrix. There is nothing in the disclosure of the patent that would lead one of skill in the art to expect a silica product having a higher than usual silanol content and any advantage that may result therefrom. The patent presents three examples of the silica disclosed therein, each silica product characterized by a set of specific physico-chemical data which include BET surface area and a Sears number (V_2). The following table shows the calculated Sears number/BET ratio of each of the examples.

	Sears Number (ml)	BET	V_2/BET ratio
Esch, Exam 1	9.0	80	0.113
Esch, Exam 2	9.1	120	0.076
Esch, Exam 3	15.7	184	0.085
Claim 1-Invention			0.150 - 0.370

The data in the table show that none of the examples of Esch et al have a V_2/BET ratio value that falls within the range specified in the present claims. In fact, the ratio values of the examples of Esch et al are all lower by at least 25 % of the minimum of the presently claimed range. In other words, the silicas of Esch et al are characterized by much fewer OH groups per square meter of surface area. Thus, the silica of Esch et al is not that of the present invention.

Based on the Esch et al patent, which is the most relevant of the cited prior art, one of skill in the art would not be led by the patent to produce a silica that has a high V_2/BET ratio of the range of the present claims. Even if one hypothetically can make the appropriate selection of a BET value from the generic range shown in the reference, as well as an appropriate selection of a V_2 value from the generic range of the reference and arrive at a ratio value of, for instance, 0.170, one of skill would not be enabled by the reference to produce such a silica. Again, note that the three examples of the patent have calculated V_2/BET values that are at least 25 % lower than the claimed range of the present claims. Thus, the examples of the patent would not lead to high reinforcing levels for a silica in a rubber matrix. Contrast this situation with an example of the present invention in Table 2.4 on page 39 (Samples A and B) where the stress data show the superior reinforcement levels of filled rubber material of the invention versus a reference example. (Compositions of the examples shown in Table 2.4 are described in detail in Table 2.1 on page 36 of the text.)

Additional improved effects of the invention are an improved dispersion behavior and vulcanization times (see page 4, lines 15-17 of the text), and data from page 39, line 19 to page 40, line 3 and page 44, lines 3 to 14). The reference example in Table 2.5 on page 40 of the text, where the composition contains Ultrasil 3370 GR, is Example 3 of the Esch et al patent. Thus, a direct comparison of the reference with Example 2.2 of the present invention is provided.

Still another direct comparison of the present invention with Esch et al is provided by the evidence submitted in the attached declaration which compares a rubber composition and product of Example 3 of Esch et al with Example 1.5 of the present specification. A comparison is provided in Table 4 of the declaration between ascertained property values of the rubber composition of Example 3 of Esch et al prepared from a precipitated silica having a V_2/BET ratio of 0.085 ml/5 m^2 with the same property values of the rubber composition of Example 1.5 of the present specification that is prepared from a precipitated silica having a V_2/BET ratio of 0.227 ml/5 m^2. (The declaration in Tables 1 to 3 provides the necessary information concerning the rubber formulation derived from the precipitated silica of Example 3 of Esch et al.) **STOPPED** The data in the Table 4 show a better Mooney viscosity M_L value in the MDR test. This indicates a superior processing property of the compounded rubber material within the scope of the present invention. Desirably, the vulcanization time t 90 % and the vulcanization rate t 80 % - t 20 % are drastically reduced over the values of the compared composition of Esch et al. These greatly improved raw-mixture properties can be attributed, in particular, to the higher and better ratio of Sears number to BET surface area, since faster and more effective hydrophobing, and consequently greater binding capacity of the silane to the silica is possible. The greatly improved properties of the vulcanized derivative can also be attributed for the most part to this analytical characteristic. For example, the improved binding of the silica leads to better reinforcement

of the vulcanized derivative in the tension test, as can be observed in the higher value of Modulus 200 % and the higher Modulus 200 %/50 % reinforcement factor. As a consequence, the DIN abrasion is improved by more than 18 %. The hysteresis behavior, which correlates directly with the rolling resistance of a tire that is finished with the present running-surface compound, can also be improved simultaneously by more than 18 % with the precipitated silica of the invention (see tan δ, 60° C). This improvement is also confirmed by the ball rebound value at 70° C.

The deficiencies of Esch et al are neither overcome nor improved upon by Boyer. The reference is only cited to demonstrate that a specific moisture level is obvious. Boyer does not teach a silica which features the Sears number (V_2)/BET ratio of the present invention. Accordingly, withdrawal of the rejection is respectfully requested.

Claims 1-9, 16, 17 and 19-21 stand rejected based on 35 USC 103(a) as obvious over Uhrlandt et al, U.S. Patent 6,180,076 in view of Boyer et al, U.S. Patent 5,935,543. This ground of rejection is respectfully traversed.

The comments as presented above with respect to the combination of Esch et al and Boyer et al apply equally as well to the combination of Uhrlandt et al and Boyer et al. Withdrawal of the rejection is respectfully requested.

Obviousness-type Double Patenting

The obviousness-type double patenting rejection is a provisional rejection. Accordingly, applicants will take appropriate action in the case upon the indication of allowable subject matter in either case.

It is believed that the application is in proper condition for allowance. Early notice to

this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413-2220

Frederick D. Vastine
Registration No. 27,013